

- (b) **Miscellaneous Pipe.** Set pipe used in miscellaneous work—such as conduits or drains through concrete curb, sidewalks, or retaining walls—as shown on the Plans or as directed by the Engineer. When pipe is embedded in concrete, take care to work the concrete in well around the pipe.

622.05. METHOD OF MEASUREMENT.

Pipe railing will be measured by the linear foot (meter) of pipe railing complete in place, measured center to center of the end posts. Posts of steel or concrete will not be measured for payment.

When classified for payment, *miscellaneous pipe work* will be paid for by the linear foot (meter) of pipe. When this class of work is not specifically classified on the Plans or in the Proposal for payment, it will be considered as incidental work and will not be paid for as a separate item, but the cost will be included in other contract prices.

622.06. BASIS OF PAYMENT.

Accepted quantities of pipe railing and miscellaneous pipe work, measured as provided above, will be paid for at the contract unit price as follows:

- (A) PIPE RAILING LINEAR FOOT (METER)
 (B) MISCELLANEOUS PIPE WORK LINEAR FOOT (METER)

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

SECTION 623 GUARD RAIL AND GUIDE POSTS

623.01. DESCRIPTION.

This work shall consist of the construction of guard rail and guide posts in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

The types of guard rail are designated as follows:

- Beam Guard Rail-Steel-W-Beam-Single
- Beam Guard Rail-Steel-W-Beam-Double
- Beam Guard Rail-Steel-Thrie Beam-Single
- Beam Guard Rail-Steel-Thrie Beam-Double
- Beam Guard Rail-Steel-Transition Section
- Guard Rail Anchor Unit
- Guard Rail Extruder Terminal
- The Trend (Transition End Treatment)
- The Sentre (Safety Barrier End Treatment)

Guide Post with Reflective Bands shall be wood as specified.

623.02 . MATERIALS.

Materials shall meet the requirements specified in the following Subsections of Section 700 - Materials:

| | |
|-----------------------------------|--------|
| Portland Cement Concrete, Class A | 701. |
| Epoxy Resin Adhesive | 701.13 |
| Reinforcing Steel | 723. |
| Zinc Rich Paint | 730.02 |
| Guard Rail Posts | 732.01 |
| Guide Posts (Wood) | 732.02 |
| Spacer Blocks | 732.01 |
| Beam Guard Rail Elements | 732.01 |
| Fittings (Steel) Hardware | 732.01 |
| Wire Cable and Fittings | 732.05 |
| Reflective Sheeting | 733.05 |
| Nonshrink Grout | 733.07 |

623.04. CONSTRUCTION METHODS.**(a) Setting Posts for Guard Rail, Guide Posts, or Barrier Posts**

- Set posts for guard rail in accordance with the Plans.
- When posts are to be set in the ground, set them in holes that have been dug in thoroughly compacted soil.
- Keep the bottom of the holes free of loose material so that the post will have a stable foundation.
- Space the posts as shown on the Plans, setting them plumb and with the front faces in a straight line, or if on a curve, at a uniform distance from the edge of the pavement.
- Set the top of the post to the elevation shown on the Plans or as approved by the Engineer.
- After the posts are placed, backfill the holes with approved material, thoroughly compacted in layers not to exceed 6 inches (150 mm) in depth and in such manner as not to shift the posts from the correct alignment.

NOTE: Posts for guard rail may also be machine driven. Promptly fill any depression in the surface resulting from driving the posts, and tamp with like material.

All other requirements shall be as shown on the current guard rail standard drawings.

- (b) Rail Elements.** Erect rail elements in a manner resulting in a smooth, continuous installation. All bolts, except adjustment bolts, shall be drawn tight. Bolts shall be of sufficient length to extend beyond the nuts.

Where painting of railing components is specified, correct any damage to the shop coat of paint by applying an approved rust-inhibitive primer prior to other painting. If any surfaces will be inaccessible to paint after erection, field paint them before they're erected. Give the railing components the specified number of coats of paint, uniformly applying them by thorough brushing or by approved pressure spray as specified.

Protect the following with two coats of an approved zinc rich paint: (1) galvanized surfaces which have been abraded so that the base metal is exposed; (2) threaded portions of all fittings; (3) and fasteners and cut ends of bolts.

Where double-faced guard rail is specified, install it in accordance with the Plans.

- (c) **Placing Metal Plate Rails and Fittings.** Where metal plate rails are specified or used, fasten them to the posts in the manner shown on the Plans. The plate shall be at the elevation shown on the Plans. All laps in the rail shall conform to the direction of traffic on the roadway.

When the type of metal plate guard rail to be used is not specifically set out on the Plans, no more than one type will be permitted on any one Project.

- (d) **Placing Reflective Sheeting on Guide Posts.** After the posts are set, provide them with reflective sheeting when specified, fixed to the post with four 8d box nails as shown on the Plans.

- (e) **Guard Rail Anchor Units.** Construct guard rail anchor units as shown on the Plans. When rock harder than medium sandstone (outcropping on surface, massive boulders, and ledge rock under overburden) is encountered during construction of the concrete anchor, the following steps should be followed.

- (1) For surface outcropping, drill four properly spaced and patterned 2 inches (50 mm) diameter holes to receive the full depth anchor bolts as shown on the Plans. Half fill the rock holes with pourable epoxy grout, insert the bolts, and stabilize them to their final position; then fill the remainder of the hole. Air bubbles and voids shall be expelled from the holes to guarantee full bearing of the bolts.

- (2) For rock with a soil overburden up to 18 inches (450 mm) deep, following these steps:

- Drill the four, properly-spaced holes to receive the anchor bolts.
- Drill four additional holes at 2 1/2 inch (64 mm) diameter, spaced at 90° and 12 inches (300 mm) from center of concrete anchor.
- Half fill the outer holes with pourable epoxy grout; then insert and stabilize plumb one number 9 reinforcing steel bar per hole, cut to the proper length.
- Fill the remaining hole and expel any bubbles. Length should enable insertion of full 12 inches (300 mm) into the rock and clear the top of the concrete anchor by 2 inches (50 mm).
- Tie the 6x6-W1.5xW1.5 wire mesh to the bars after grout is dry.
- Spread pourable epoxy grout on the mating surface between the rock and concrete for positive bond.
- Construct the upper portion with the same details as shown on the Plans.

- (3) For encountered rock at depths greater than 18 inches (450 mm), omit the holes for the four anchor bolts and construct the anchor as covered in 623.04(e) above.

623.05. METHOD OF MEASUREMENT.

Beam guard rail single and double, and thrie beam single and double will be measured by the linear foot (meter) using the nominal distance from center to center of the supporting posts. *Beam guard rail transition sections, guard rail anchor units, and guide posts* will be measured by each unit.

623.06. BASIS OF PAYMENT.

The accepted quantities of the various items, measured as provided above, will be paid for at the contract unit price as follows:

- (A) BEAM GUARD RAIL-W-BEAM-SINGLELINEAR FOOT (METER)
- (B) BEAM GUARD RAIL-W-BEAM DOUBLE LINEAR FOOT (METER)
- (C) BEAM GUARD RAIL-THRIE BEAM-SINGLE..... LINEAR FOOT (METER)
- (D) BEAM GUARD RAIL-THRIE BEAM-DOUBLE LINEAR FOOT (METER)
- (E) BEAM GUARD RAIL-TRANSITION SECTION EACH
- (F) GUARD RAILANCHOR UNIT EACH
- (G) GUIDE POSTS EACH

Such payment shall be full compensation for furnishing all materials, equipment, labor, and incidentals to complete the work as specified.

SECTION 624 FENCES

624.01. DESCRIPTION.

This work shall consist of the construction of fence and gates in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Plans or established by the Engineer.

The style, type, and/or class of fence will be as shown on the Plans. The styles are designated as follows:

- (a) Fence, Style WWF (Woven Wire Fence)
- (b) Fence, Style SWF (Strand Wire Fence)
- (c) Fence, Style CLF (Chain Link Fence)
- (d) Fence, Style GDF (Glare Deflector Fence)
- (e) Fence, Metal Panel

Fence gates shall be installed at locations shown on the Plans or as directed by the Engineer, and in accordance with the Plans.

624.02. MATERIALS.

Materials shall meet the requirements specified in the following Subsections of Section 700 - Materials:

| | |
|-----------------------------------|--------|
| Portland Cement Concrete, Class A | 701. |
| Zinc Rich Paint | 730.02 |
| Fence, Style WWF | 732.06 |
| Fence, Style SWF | 732.06 |
| Fence, Style CLF | 732.07 |
| Fence, Style GDF | 732.08 |